

Assessment of the Dose Rates due to Water Activation on an Isolation Valve of the DEMO WCLL Breeding Blanket Primary Heat Transfer System

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Within the framework of the activities foreseen by the EUROfusion action on the cooling water activation assessment for a DEMO reactor equipped with a Water Cooled Lithium Lead Breeding Blanket (WCLL BB), the University of Palermo is involved in the investigation of dose rates induced by the decay of nitrogen radioisotopes produced by water activation, nearby the main components (e.g. isolation valves) of both First Wall (FW) and Breeder Zone (BZ) cooling circuits.

The aim of this work is to assess the spatial distribution of these dose rates in the DEMO Upper Pipe Chase (UPC), focusing the attention on the space neighboring a typical isolation valve of the Primary Heat Transfer System (PHTS). To this end, a computational approach has been followed adopting MCNP5 Monte Carlo code. In particular, a totally heterogeneous neutronic model of a portion of the UPC has been set up, including the valve and the main FW and BZ PHTS piping, and the spatial distribution of nitrogen isotopes concentrations, previously assessed, have been used to model the photonic and neutronic sources.

The results obtained, herewith presented and critically discussed, provided some information on the nuclear issues of the WCLL BB PHTS, to be considered as hints for the blanket design optimization.

Keywords DEMO, WCLL blanket, dose rate, neutronics

Topic Category	Blanket Technology
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